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IN THE CLAIMS:

Please amend the claims to read as follows:

1. (Currently amended) A method for estimating a threshold value in deciding data along an amplitude by a terminal performing wireless communication with a wireless station in accordance with multi-level QAM (quadrature amplitude modulation), said method comprising <u>executing a sequence of instructions in said terminal for</u>:

presupposing in which one of multiple levels can be a level of a received data signal and setting up a plurality of threshold values assumed (referred to herein as 'assumed threshold values') in association with said presupposition<u>, said received data signal being transmitted without a synchronization signal along an amplitude direction</u>;

updating sequentially the assumed threshold values based on ~~the~~ received data; and

selecting an ultimate threshold value from said plural assumed threshold values.

2. (Previously presented) The method according to claim 1, wherein said selecting includes selecting one threshold value based on a number of times of occurrence of the data pertaining to respective levels partitioned by said assumed threshold values.

3. (Currently amended) The method according to claim 1, wherein said selecting includes ~~steps of~~:

calculating a difference between ratios between low level data and high level data separated by said plural assumed threshold values and a predetermined ratio; and

selecting ~~the~~ <u>a</u> threshold value with ~~the~~ <u>a</u> smaller difference.

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4. (Currently amended) The method according to claim 1, wherein ~~in~~ said selecting, ~~in~~ ~~performing~~ comprises:

calculating a difference between ~~the~~ ratios between low level data and high level data separated by said plural assumed threshold values and ~~the~~ a predetermined ratio; and

selecting ~~the~~ a threshold value with ~~the~~ a smaller difference; ~~a decision to the effect,~~ including deciding that there exists no proper value ~~is made, and a value calculated last time~~ ~~is used,~~ if said difference is larger than ~~a~~ said predetermined value, and a value calculated last time is used as the threshold value.

5. (Previously presented) The method according to claim 1, wherein said selecting includes selecting a threshold value with a smaller difference of calculated average data of the plural data from respective received data.

6. (Currently amended) The method according to claim 1, wherein in said selecting, in performing a selecting a threshold value with a smaller difference of calculated average data of the plural data from respective received data, it is determined that ~~there lacks~~ a proper value is lacking and a previous threshold value is used, if said difference is larger than a predetermined value.

7. (Currently amended) The method according to claim 1, wherein said updating includes presuming data positions for ~~the~~ a totality of plural assumed threshold values, from one received data to another, and calculating the totality of the assumed threshold values.

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8. (Previously presented) The method according to claim 1, wherein said updating detects to which level belongs the received data, for said assumed threshold values, and wherein, of said plural assumed threshold values, a certain one or ones may not be updated each time the data is received.

9. (Currently amended) The method according to claim 1, further comprising transforming phase-synchronized received multi-level QAM data into data in ~~the~~ a first quadrant of ~~the~~ a coordinate system of I and Q axes, wherein

said data transformed into the data of the first quadrant is used as the data used in calculating the threshold values in said presupposing and updating steps.

10. (Previously presented) The method according to claim 9, wherein said transforming the data to said first quadrant includes a step of moving the data into said first quadrant by taking an absolute value of the multi-level QAM data or by rotating the multi-level QAM data.

11. (Currently amended) The method according to claim 1, further comprising:

normalizing the received data using a fading vector; and

providing a threshold value for amplitude demodulation as a coefficient for the fading vector to follow a fading.

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12. (Currently amended) The method according to claim 1, further comprising calculating a threshold value from received data and re-calculating the threshold value with a relatively short period for following a fading.

13. (Currently amended) The method according to claim 1, wherein

in a case ~~the~~ a number of data used for calculating the threshold value exceeds a preset number, the updating of the assumed threshold value is terminated and wherein

one of a plurality of assumed threshold values is selected in said selecting.

14. (Currently amended) The method according to claim 1, wherein

in a case ~~the~~ a number of data used for calculating the threshold value exceeds a preset number, and an error between ~~the~~ a value of the level of the multiple levels corresponding to said assumed threshold value and the data satisfies a preset condition, the updating of the assumed threshold value is ~~terminated;~~ terminated, and wherein

one of a plurality of said assumed threshold values is selected in said selecting.

15. (Currently amended) The method according to claim 1, further comprising:

deciding which assumption has been correct, based on a frequency of occurrence of the data in ~~the~~ a level of the multiple levels corresponding to said assumed threshold value and/or on an error of the received data with respect to each assumed level of the multiple levels, to determine a threshold value; and

effecting an amplitude demodulation using said threshold value.

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16. (Currently amended) The method according to claim 1, wherein

~~the~~ amplitude information is not definitely supplied from a wireless base station of a

transmitting side to a terminal of a receiving side as a synchronization signal;

wherein said terminal assumes, at ~~the~~ an outset, a plurality of possibilities as to which

level said data belongs to, in said presupposing and said updating, using ~~the~~ a size of the

received data, and ~~raises~~ improves an accuracy of the assumed value, using a plural number

of said data; and

wherein in said selecting, one of the plural assumed levels is selected, using ~~the~~ a

frequency of occurrence of each assumed level of the multiple levels, and differences with

respect to the data, to estimate the threshold value to demodulate the data.

17. (Currently amended) The method according to claim 1, wherein said terminal has a

threshold value detection unit including a counter for counting the received data and first to

third counters for counting the data of first to third levels, divided by ~~said~~ first and second

threshold ~~values;~~ values, said method further comprising:

(a) said threshold value detection unit initializing each of said counters;

(b) said threshold value detection unit calculating, responsive to ~~the~~ a value of a first

input signal, a first threshold value in a case the first input signal is assumed to be of one of

high and low levels and a second threshold value in a case the first input signal is assumed to

be of another level;

(c) said threshold value detection unit deciding, as from a signal next to the first input

signal, a relative magnitude of the input signal with respect to the first and second threshold

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values;

(d) said threshold value detection unit summing the input data to a corresponding level holding value of said first to third level data, divided by said first and second values, based on ~~the~~ decided results, for averaging out ~~the~~ a relevant level holding value;

(e) said threshold value detection unit updating the first and second threshold values, based on said level holding values of said first to third levels;

(f) said threshold value detection unit performing a control for carrying out ~~the~~ a decision and averaging processing as from said ~~step~~ deciding (c), if ~~the~~ a value of the counter counting said data is smaller than a preset first value;

(g) said threshold value detection unit performing a control so that, if ~~the~~ a value of said counter counting the data is not less than said first value, the counter counting said data is compared to a second value, so that, if the value of said counter counting the data is less than said second value, error values between the level holding values of said first to third levels, divided by said first and second threshold values, and said input data, are compared to a preset third value, and so that, if ~~the~~ an error value is not smaller than the preset third value, the decision and averaging processing as from said ~~step~~ deciding (c) will be carried ~~out: and~~ out; and

(h) said threshold value detection unit performing control so that, if the error value is smaller than said third value, or the value of the counter counting the data is larger than said second value, the count value of said first counter is compared to the count value of said third counter, to output the threshold value with ~~the~~ a larger count value.

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18. (Currently amended) The method according to claim 1, wherein said terminal includes a

threshold value detection unit ~~at least~~ including a counter for counting the received ~~data; said~~

data, said method comprising:

(a) said threshold value detection unit initializing said counter;

(b) said threshold value detection unit calculating, responsive to ~~the~~ a value of a first

input signal, a first threshold value and a second threshold value in a case the first input

signal is assumed to be of one of high and low levels and in a case the first input signal is

assumed to be of ~~said~~ another level, respectively;

(c) said threshold value detection unit deciding, as from a signal next to the first input

signal, ~~the~~ relative magnitudes of the input signals with respect to the first and second

threshold values;

(d) said threshold value detection unit adding input data to a corresponding level

holding value of said first to third level data, divided by said first and second values, based on

~~the~~ decided results, for averaging out said level holding value;

(e) said threshold value detection unit updating the first and second threshold values,

based on said level holding values of said first to third levels;

(f) said threshold value detection unit performing control for carrying out the decision

and averaging processing as from said deciding (c), if the value of the counter counting said

data is smaller than a preset first value;

(g) said threshold value detection unit performing control so that, if ~~the~~ a value of

said counter counting the data is not less than said first value, the counter counting said data

is compared to a second value and, if the value of said counter counting the data is less than

said second value, error values between the level holding values of said first to third levels,

divided by said first and second threshold values, and said input data, are compared to a

preset third value, and so that, if the error value is not smaller than the preset third value, the

decision and averaging processing as from said deciding (c) will be carried ~~out: and~~ out; and

(h) said threshold value detection unit performing control for outputting the threshold

value with ~~the~~ a ratio of ~~the~~ a high level to ~~the~~ a low level of the level holding value of each

level closer to a preset ratio, if the error value is smaller than said third value, or the value of

the counter counting the data is larger than said second value.

19. (Currently amended) The method according to claim 18, wherein said threshold value

detection unit of said terminal includes first to third counters for counting data of said first to

third levels, divided by said first and second threshold values;

said initializing including initializing each counter;

said summing including incrementing ~~the~~ an associated counter based on ~~the~~ results of

a decision; and

said performing control including:

deciding whether or not the value of the ratio between the level holding value

of said first level and the level holding value of said second level and the value of the ratio

between the level holding value of said third level and the level holding value of said second

level satisfy respective preset ~~values;~~ values, said ~~step (h)~~ deriving (h), in a case of said ratio

values not satisfying the respective preset values, derives the level holding value of said

second level by averaging from the level holding value of said first or third level and from the

level holding value of said second level, and updating the threshold value;

selecting ~~the~~ a threshold value with ~~the~~ a larger count value; and

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using ~~the~~ a̲ last calculated value in a̲ case of a̲n̲ absence of a proper ratio.

20. (Currently amended) The method according to claim 1, wherein said terminal includes a threshold value detection unit ~~at least~~ including a counter for counting the received ~~data;~~ data, said method comprising:

(a) said threshold value detection unit initializing said counter;

(b) said threshold value detection unit calculating and setting, responsive to ~~the~~ a̲ first input signal, each of first to m-th(where m is an integer not less than 1) threshold values, in a̲ case the first input value is presumed to be of the (m+1)-th level, from the first to m-th threshold values, in a̲ case the first input signal is presumed to be of the first level, m being a preset integer not less than 1;

said method also including, for each of the cases where the first input signal is assumed to be from the first level to the (m+1)-th level,

(c) said threshold value detecting unit deciding, as from a signal next to the initial signal, the relative magnitude of the input data with respect to the first to mth threshold values of the input data;

(d) said threshold value detecting unit updating, based on ~~the~~ decided results, an associated level holding values of the first level to the (m+1)-th level data, divided by said first to m-th threshold values, using the input data;

(e) said threshold value detecting unit updating the threshold value, based on data of said first to (m+1)-th levels;

(f) said threshold value detecting unit performing control for carrying out ~~the~~ a̲ processing of a̲ decision and a̲n̲ updating as from said ~~step~~ deciding (c) in a̲ case ~~the~~ a̲ value

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of the counter counting said data is smaller than a preset value; and

(g) said threshold value detecting unit performing control so that, in a case the value

of the counter counting said data is not smaller than a preset value, an error of a ratio as to the

level holding values from a preset ratio is calculated for each of the first to m-th threshold

levels, and each threshold value corresponding to a smaller error value is output.

21. (Original) The method according to claim 20, wherein, when said threshold value

detecting unit updates an associated level holding value of the first to (m+1)-th level data,

divided by said first to m-th threshold values, using said input data, a difference between the

original level holding value and the input data multiplied by a preset coefficient is summed to

the original level holding value.

22. (Currently amended) The method according to claim 1, wherein said terminal includes a

threshold value detection unit at least having a counter for counting received data, said

method further comprising:

(a) said threshold value detection unit initializing said counter; and

(b) said threshold value detection unit calculating and setting, responsive to a value of

the first input signal, each of the first to the m-th threshold values in a case said first input

signal is assumed to be of the (m+1)-th level, m being a preset integer not less than 1, from

the first to m-th threshold values in a case said first input signal is assumed to be of the first

level;

said method also comprising, for each of the cases where the first input signal

is assumed to be of the first to (m+1)-th levels,

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(c) said threshold value detection unit deciding, as from a signal next to the first

signal, ~~the~~ relative magnitudes of the input data with respect to the first to m-th threshold

values;

(d) said threshold value detection unit averaging, based on ~~the~~ decided results, an

associated level holding values of said first to (m+1)-th level data, divided by said first to m-

th threshold values, using the input data, and storing said input data in a storage unit;

(e) said threshold value detection unit updating the value of said threshold value,

based on the hold values of said first to (m+1)-th levels;

(f) said threshold value detection unit performing control for carrying out ~~the~~ a

processing of decision and updating will be carried out as from a signal next to the ~~step~~

deciding (c), in a case the value of the counter counting the data is smaller than a preset

value;

(g) said threshold value detection unit calculating, in a case ~~the~~ a value of the counter

counting said data is not less than said preset value, a total sum of ~~the~~ a sum of errors of the

data stored in said storage unit and the level holding values for the respective cases where

said first input signal is assumed to be of the first level to the (m+1)-th levels (referred to as

'first to (m+1)-th errors'); and

(h) comparing ~~the~~ relative magnitudes of ~~said~~ first to (m+1)-th differences and

selecting and outputting ~~the~~ a threshold value with a smaller difference.

23. (Currently amended) The method according to claim 20, wherein, in said

deciding the relative magnitudes with respect to said first to m-th threshold values, the

associated error is set to a predetermined value.

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24. (Currently amended) The method according to claim 1, wherein said terminal

includes a threshold value detection unit, said method comprising:

(a) said threshold value detection unit calculating and setting, responsive to ~~the~~ a first

input signal, each of first to m-th threshold values, in a case the first input value is presumed

to be of the (m+1)-th level, from the first to m-th threshold value, in a case the first input

signal is presumed to be of the first level;

said method also including, for each of ~~the~~ cases where the first input signal is

assumed to be from the first level to the (m+1)-th levels,

(b) deciding, as from a signal next to the first signal, ~~the~~ relative magnitudes of the

input data with respect to the first to the m-th threshold value;

(c) summing the input data to an associated value of the first to (m+1)-th data, ~~divided~~

~~by said first to the m-th threshold values,~~ divided by said first to m-th threshold values, based

on ~~said~~ decided results, by way of averaging, and calculating an error;

(d) said threshold value detection unit re-calculating said threshold values, based on

the data of said first level to the (m+1)-th level;

(e) further carrying out a sequence of decision and averaging operations in a case the

error value is larger than a predetermined first value;

(f) calculating, in a case the error value is smaller than said first value, ~~the~~ a sum or an

average value of ~~the~~ latest differences of the input data with respect to ~~the~~ assumed

differences of the first to (m+1)-th levels; and

(g) said threshold value detection unit deciding ~~the~~ a minimum value among error

values as results of respective assumptions, to decide which assumption has been correct, to

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output the value of the respective threshold values.

25. (Currently amended) A terminal apparatus performing wireless communication with a

wireless station in accordance with a multi-level QAM (quadrature amplitude modulation),

said terminal apparatus comprising:

an amplitude synchronization detection unit for estimating a threshold value for

deciding data along an amplitude; and

an amplitude demodulating unit for effecting amplitude demodulation using said

threshold ~~value;~~ value,

said amplitude synchronization detection unit including:

a setup unit presupposing which of a level ~~the~~ a received data signal may

belong to and for setting up a plural number of threshold values that may be assumed in

association with ~~said~~ a presupposition (referred to as assumed threshold values);

a an update unit sequentially updating said assumed threshold values based on

the received data signal; and

a selection unit selecting an ultimate threshold value from the plural assumed

threshold values.

26. (Previously presented) The terminal apparatus according to claim 25, wherein said

selection unit selects one of said plural assumed threshold values based on a number of times

of occurrence of the data in said levels divided by said assumed threshold values.

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27. (Currently amended) The terminal apparatus according to claim 25, wherein said

selection unit calculates a difference between ratios between ~~the~~ low level data and ~~the~~ high

level data divided by said plural assumed threshold values and a preset ratio and selects ~~the~~ a

threshold value with ~~the~~ a smaller difference.

28. (Currently amended) The terminal apparatus according to claim 25, wherein, if, when

said selection unit calculates a difference between ratios between ~~the~~ low level data and ~~the~~

high level data divided by said plural assumed threshold values and a preset ratio and selects

~~the~~ a threshold value with ~~the~~ a smaller difference, said difference is larger than a preset

value, the selection unit determines that ~~there lacks~~ a proper value is lacking and uses a

previous threshold value.

29. (Currently amended) The terminal apparatus according to claim 25, wherein said

selection unit selects ~~the~~ a threshold value with a smaller difference from each received data

of ~~the~~ ultimately calculated average data of plural data.

30. (Currently amended) The terminal apparatus according to claim 25, wherein, when said

selection unit selects ~~the~~ a threshold value with a smaller difference from each received data

of ~~the~~ ultimately calculated average data of plural data, said difference is larger than a

predetermined value, said selection unit determines that ~~there lacks~~ a proper value is lacking

and uses a previous threshold value.

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31. (Currently amended) The terminal apparatus according to claim 25, wherein said update

unit presupposes data positions for ~~the~~ a totality of the assumed threshold values, from one

received data to another, to calculate the totality of the assumed threshold values.

32. (Original) The terminal apparatus according to claim 25, wherein said update unit

detects to which level the received data belongs and wherein there are cases where plural

assumed threshold values are not updated each time.

33. (Currently amended) The terminal apparatus according to claim 25, further comprising

a transformation unit executing transformation of the phase-synchronized multi-level

QAM data into a first quadrant of a coordinate system of I and Q ~~axes;~~ axes, wherein the

threshold values are calculated on ~~the~~ a basis of the transformed data.

34. (Original) The terminal apparatus according to claim 33, wherein said transformation

unit moves the multi-level QAM data to the first quadrant of the I and Q axes by taking

absolute values of or rotating the multi-level QAM data.

35. (Currently amended) The terminal apparatus according to claim 25, further comprising

a unit for normalizing the received data using a fading ~~vector;~~ vector, wherein

threshold value estimation is carried out on the basis of the normalized ~~data;~~ data, and

wherein

a threshold value for amplitude demodulation is accorded as a coefficient for the

fading vector for following up with a fading.

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36. (Currently amended) The terminal apparatus according to claim 25, further comprising

a unit for calculating the threshold value from received data and for re-calculating the

threshold value with a relatively short period to follow a fading.

37. (Currently amended) The terminal apparatus according to claim 25, wherein

the updating of the assumed threshold value is terminated when ~~the~~ a number of data

used for calculating the threshold value has exceeded a predetermined number and

~~whereinsaid~~ wherein said selection unit selects one of the plural assumed threshold values.

38. (Currently amended) The terminal apparatus according to claim 25, wherein the

updating of the assumed threshold value is terminated when ~~the~~ a number of data used for

calculating the threshold value has exceeded a predetermined number and when an error

value between ~~the~~ a value of the level of the multiple levels corresponding to the assumed

threshold value and the data meets a preset ~~condition;~~ condition,

said selection unit then selecting one of the plural assumed threshold values.

39. (Currently amended) The terminal apparatus according to claim 25, wherein said

selection unit decides which assumption is correct, based on ~~the~~ a frequency of occurrence of

data in ~~the~~ levels associated with said assumed threshold values and/or on ~~the~~ a difference of

received data with respect to the assumed levels to determine the threshold value.

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40. (Currently amended) The terminal apparatus according to claim 25, wherein

said amplitude synchronization detection unit includes a threshold value detection unit

~~at least having~~ comprising:

a counter for counting a number of received data; and

first to third counters for counting data of first to third levels divided by said

first and second threshold ~~values;~~ values,

said threshold value detection unit further including:

a first unit for initializing each of said counters;

a second unit for calculating, responsive to ~~the~~ a value of the first input signal,

a first threshold value in a case the first input signal is assumed to be one of high and low

levels and a second threshold value in a case the first input signal is assumed to be another

level;

a third unit for deciding, after ~~the~~ an initial signal, ~~the~~ relative magnitudes of

the input data with respect to the first and second threshold values;

a fourth unit for summing, based on ~~the~~ decided results, the input data to an

associated level holding value of the first to third level data, divided by said first and second

threshold values and for averaging;

a fifth unit for updating ~~the~~ values of said first and second threshold values,

based on hold values of said first to third levels;

a sixth unit for performing a control for carrying out a decision and an

averaging of said third and fourth units in a case ~~the~~ a value of the counter counting said data

is smaller than a preset first value;

a seventh unit for performing a control so that, in a case ~~the~~ a value of the

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counter counting said data is not less than said first value, the count value ~~of the count value~~

of the counter counting the data is compared to a second value and so that, in a case the value

of said counter counting the data is smaller than said second value, a difference between the

hold values of said first to third levels, divided by said first and second threshold values, and

said input data, is compared to a preset third value, said seventh unit also performing a

control for carrying out a decision and an averaging of said third and fourth units in a case

said difference is not less than said third value; and

an eighth unit for performing a control so that, when said error value is smaller

than said third value or the value of said counter counting said data is larger than said second

value, the count values of said first to third counters are compared to each other and the

threshold value with the larger count value is ~~output;~~ output,

said amplitude demodulating unit executing amplitude demodulation using the

threshold value output from said threshold value detection unit.

41. (Currently amended) The terminal apparatus according to claim 25, wherein

said amplitude synchronization detection unit includes a threshold value detection unit

~~at least~~ having a counter for counting the received ~~data;~~ data,

said threshold value detection unit ~~at least~~ further including:

a first unit for initializing said counter;

a second unit for calculating, responsive to ~~the~~ a value of a first input signal, a

~~fist~~ first threshold value in a case said first input signal is assumed to be one of first and

second levels, and a second threshold value in a case said first input signal is assumed to be

the other level;

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a third unit for deciding, as from a signal next to the first signal, ~~the~~ relative

magnitudes of the input data with respect to the first and second threshold values;

a fourth unit for summing input data to a corresponding level holding value of

the first to third level data, divided by said first and second threshold values, by way of

averaging;

a fifth unit for updating the values of said first and second threshold values,

based on hold values of said first to third levels;

a sixth unit for performing a control for carrying out a decision and an

averaging of said third and fourth units in a case ~~the~~ a value of the counter counting said data

is smaller than a preset first value;

a seventh unit for performing a control so that, in a case the value of the

counter counting said data is not less than said first value, the count value of the counter

counting the data is compared to a second value, and so that, in a case the value of said

counter counting the data is smaller than said second value, an error value between the level

holding values of said first to third levels, divided by said first and second threshold values,

and said input data, is compared to a preset third value, said seventh unit also performing a

control for carrying out a decision and an averaging of said third to fifth units in a case said

difference is not less than said third value; and

an eighth unit for performing a control so that, in a case said error value is

smaller than said third value or the value of said counter counting said data is larger than said

second value, the threshold value with a ratio of ~~the~~ high to low levels of level holding values

of said respective levels closer to a preset ratio is ~~output;~~ output,

said amplitude demodulating unit executing amplitude demodulation using the

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threshold value output from said threshold value detection unit.

42. (Currently amended) The terminal apparatus according to claim 40, wherein

in said threshold value detection unit,

said fourth unit includes control means for incrementing ~~the~~ an associated

counter based on the decided ~~results;~~ results,

said eighth unit including deciding means for deciding whether or not ~~the~~ a

value of a ratio between a hold value of said first level and a hold value of said second level

assumes a preset value and also for deciding whether or not ~~the~~ a value of a ratio between a

hold value of said third level and a hold value of said second level assumes a preset ~~value;~~

value, said deciding means, in a case the values of said ratios do not assume the preset values,

deriving the hold value of said second level as an average value from the hold values of the

first or third level and from the hold value of said second level to update the threshold value,

wherein said threshold value detection unit includes:

means for selecting the threshold value with a larger count value; and

means for using the previously calculated threshold value in a case ~~there lacks~~

a proper ratio is lacking.

43. (Currently amended) The terminal apparatus according to claim 25, wherein said

amplitude synchronization detection unit includes a threshold value detection unit ~~at least~~

having a counter for counting the received ~~data;~~ data, said threshold value detection unit ~~at~~

~~least~~ further including:

a first unit for initializing said counter;

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a second unit for calculating and setting, responsive to a first input signal, respective

threshold values from first to m-th (where m is an integer not less than 1) threshold values in

a case the first input signal is assumed to be of the first level to first to m-th threshold values

in a case the first input signal is assumed to be of the (m+1)-th level;

said threshold value detection unit also including, for each of the cases where said

first input signals are assumed to be of the first to (m+1)-th level,

a third unit for deciding, as from a signal next to the first signal, the relative

magnitudes of the input data with respect to the first to m-th threshold values;

a fourth unit for performing control, based on the decided results, for updating an

associated level holding value of first to (m+1)-th level data, divided by said first to m-th

threshold values, using the input data;

a fifth unit for updating the threshold value based on data of said first to (m+1)-th

levels;

a fifth unit for performing a control for carrying out a decision and an updating of said

third and fourth units in a case the-a value of the counter counting said data is smaller than a

preset value; and

a sixth unit for calculating, in a case the value of said counter counting said data is not

less than said preset value, an error of a ratio as to the level holding values from a preset ratio

for each of the first to m-th threshold levels, and for selecting and outputting the respective

threshold values corresponding to a smaller error; error,

said amplitude demodulating unit executing amplitude demodulation using the

threshold values output from said threshold value detection unit.

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44. (Original) The terminal apparatus according to claim 43, wherein, when the fourth unit

of said threshold value detecting unit updates an associated level holding value of the first to

(m+1)-th level data, divided by said first to m-th threshold values, using the input data, the

difference between the original level holding values and input data multiplied by a preset

coefficient is summed to the original level holding values.

45. (Currently amended) The terminal apparatus according to claim 25, wherein said

amplitude synchronization detection unit includes a threshold value detection unit at least

having a counter for counting received data; data,

said threshold value detecting unit at least further including:

a first unit for initializing said counter;

a second unit for calculating and setting, responsive to the value of the first

input signal, respective threshold values from the first to m-th (where m is an integer not less

than 1) threshold values, m being an integer not less than 1, in a case the first input signal is

assumed to be of the first level, to the first to m-th threshold values in a case the first input

signal is assumed to be of the (m+1)-th level; level, said threshold value detection unit

including, for each of the cases where said first input signal is assumed to be of the first to

(m+1)-th level; level;

a third unit for deciding, as from a signal next to the first signal, the relative

magnitudes of the input data with respect to the first to m-th threshold values;

a fourth unit for averaging, based on the decided results, the associated level

holding value of the first to (m+1)-th level data, divided by said first to m-th threshold values,

using input data, for averaging the associated level holding value and for storing the input

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data in a storage unit;

a fifth unit for updating the values of said threshold values based on hold

values of said first to (m+1)-th level;

a sixth unit for performing control for carrying out ~~the~~ a_processing of a

decision and an_updating of said third and fourth units when the value of said counter

counting said data is smaller than a preset value;

a seventh unit for calculation, in a_case the value of the counter counting said

data is not less than said preset value, a total sum of ~~the~~ a sum of errors of the data stored in

said storage unit and the level holding values for the respective cases where said first input

signal is assumed to be of the first level to the (m+1)-th levels (referred to as 'first to (m+1)-th

errors'); and

a_an_eighth unit for comparing ~~the~~ relative magnitudes of the first to (m+1)-th

differences and for selecting and outputting a threshold value with a smaller ~~difference;~~

difference,

said amplitude demodulating unit executing amplitude demodulation using the

threshold value output from said threshold value detection unit.

46. (Original) The terminal apparatus according to claim 43, wherein, in deciding the

relative magnitudes with respect to said first and second threshold values, the associated error

is set to a preset value.

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47. (Currently amended) The terminal apparatus according to claim 25, wherein said

amplitude synchronization detection unit includes a threshold value detection unit;

said threshold value detection unit includes a unit for calculating and setting,

responsive to the a value of the first input signal, respective threshold values from the first to

m-th (where m is an integer not less than 1) threshold values, in a case the first input signal is

assumed to be of the first level, to the first to m-th threshold values in a case the first input

signal is assumed to be of the (m+1)-th level;

said threshold value detection unit also including, for each of the cases where the first

input signal is assumed to be of from the first level to the (m+1)-th level, a unit for

performing a control to execute:

a first processing for deciding, as from a signal next to the first signal, the

relative magnitudes of the input data with respect to the first to m-th threshold values;

a second processing for summing the input data to an associated level holding

value of from the first to the (m+1)-th level data, divided by said first to m-th threshold

values, based on the decided results, by way of averaging, and for obtaining respective error

values;

a third processing for re-calculating the values of said threshold values, based

on said data of from the first level to the (m+1)-th level;

a fourth processing for carrying out the decision and averaging of said first

processing, second processing and said third processing in case the error values are larger

than a predetermined first value: value; and

a fifth processing for calculating a sum or an average value of latest error

values of said input data with respect to assumed data of from the first level to the (m+1)-th

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level, in case said error values are smaller than said first value; and

a unit for deciding ~~the~~ a minimum value among error values as results of respective

assumptions, to decide which assumption has been correct, to output the value of the

respective threshold ~~values;~~ values,

said amplitude demodulating unit executing amplitude demodulation using the

threshold value output from said threshold value detection unit.

48. (Currently amended) The terminal apparatus according to claim 25, comprising:

a demodulating unit including a phase synchronization unit;

a fading vector estimating unit; and

an amplitude modulating ~~unit;~~ unit,

said amplitude synchronization detection unit including:

a first-quadrant transformation unit; and

a threshold value detection ~~unit;~~ unit,

said fading vector estimating unit receiving a CPICH (common pilot channel)

spread/demodulated signal to output a fading vector with a reduced noise ratio;

said phase synchronization unit receiving a HS-PDSCH (physical downlink common

channel) spread/demodulated signal and multiplying the HS-PDSCH spread/demodulated

signal with a complex conjugate of the fading vector, inclusive of ~~the~~ information on the

transmission line, to generate HS-PDSCH 1 and HS-PDSCH Q signals freed of ~~the~~ a phase

offset which is ~~the~~ an effect of the transmission line, to send said I and Q signals to said

amplitude synchronization detection unit and to said amplitude demodulating unit;

said first-quadrant transformation unit including a unit for outputting a first quadrant

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signal obtained on transforming second, third and fourth quadrant signals of the phase-

synchronized HS-PDSCH 1 and HS-PDSCH Q signals to the first quadrant;

said threshold value detection unit including a unit for calculating threshold values for

the multi-level QAM from said first quadrant signal or from said first quadrant signal and the

fading vector to send the threshold value signal to said amplitude demodulating unit; and

said amplitude demodulating unit deciding the relative signal amplitudes of said

threshold signals and said signals from said HS-PDSCH 1 and HS-PDSCH Q signals and said

threshold signals to output multi-level QAM demodulated signals.

49. (Currently amended) The terminal apparatus according to claim 48, wherein said

threshold value detection unit includes means for assuming a plurality of possibilities in

advance, as to which level received data belongs to, with the a use of the a magnitude of the

received signal, for improving the a precision of the assumed values with the a use of a

plurality of said data, and for estimating the threshold values, from the assumed plural values,

with the a use of the a frequency or an error from the data.

50. (Original) The terminal apparatus according to claim 49, wherein said threshold value

detection unit multiplies the fading vector signal with the threshold value as found to output

the resulting product as said threshold value signal.

51. (Original) A communication system comprising the terminal apparatus as set forth in

claim 25 and a base station communicating with said mobile station in accordance with the

multi-level QAM system.

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52. (Currently amended) A method for estimating a threshold value in order for a mobile station to decide data along an amplitude, said mobile station being a part of a cellular system in which data communication takes place for transmission from a base station to said mobile station over a downlink channel, using a high speed physical downlink shared channel (HS-PDSCH) in accordance with ~~the~~ a multi-level QAM (quadrature amplitude modulation) system, said method comprising the steps of:

setting up an assumed value of said threshold value based on at least one of received data; and

determining ~~the~~ an ultimate threshold value based on the threshold value updated in accordance with received data.

53. (Currently amended) A mobile station forming a cellular system in which data communication takes place for transmission from a base station to the mobile station over a downlink channel, using a high speed physical downlink shared channel (HS-PDSCH) in accordance with the multi-level QAM (quadrature amplitude modulation) system, said mobile station comprising:

a unit for setting an assumed value of ~~said~~ a threshold value for deciding data in ~~the~~ an amplitude direction, based on at least one of received data; and

a unit for determining ~~the~~ an ultimate threshold value based on the threshold value as updated in accordance with received data.